

REMARKS

This amendment is filed in response to the final rejection dated April 26, 2004. This amendment should be entered, the application allowed, and the case passed to issue.

This amendment should be entered as no new matter or considerations are introduced by this amendment. New claims 17-20 all depend from allowed claim 3, and are clearly allowable for at least the same reasons as claim 3. Claim 3 is generic to claims 17-20, as claims 17-20 include all the limitations of claim 3. As the Examiner explained in the Restriction Requirement of May 31, 2002, “[u]pon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 C.F.R. 1.141.” Applicants submit that new claims 17-20 meet these requirements, and thus, should be considered and allowed. During a telephone interview on June 24, 2004, Examiner Sarkar confirmed that claims to additional species that depend from an allowed generic claim would be considered. Applicants gratefully acknowledge Examiner Sarkar’s courtesy of conducting the telephone interview.

No new matter or considerations are introduced by new claims 17-20. New claim 17 is supported by the specification at page 12, lines 6-14, lines 20-22; and page 12, line 32 to page 13 line 3, which clearly teaches the conductive radiator and shield plane. New claim 18 is supported by the specification at page 13, lines 29-31, which clearly teaches the radiating fin attached to the external face of the conductive radiator. Support for new claim 19 is found in the specification at page 6, lines 35-37 and page 9, lines 22-24, which clearly teaches a mold resin covering the semiconductor chip and chip capacitor.

Support for new claim 20 is found at page 7, lines 29-30, which clearly teaches the underfill resin.

Claims 2-4, 6, 7, 9, and 16-20 are pending in this application. Claims 4, 6, 7, and 9 are withdrawn from consideration pursuant to an election of species requirement. Claims 1, 5, 8, and 10-15 have been canceled. Claims 17-20 are newly added.

Claim Rejections Under 35 U.S.C. § 103

Claims 2 and 16 are rejected under 35 U.S.C. § 103(a) as obvious over Ference (U.S. Patent No. 6,225,669), McCormick (U.S. Patent No. 6,369,448), or Lin (U.S. Patent App. No. 2003/0205826) in view of Wenzel (U.S. Patent No. 6,150,724). These rejections are traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention as claimed and the cited prior art.

An aspect of the invention, per claim 2, is a semiconductor device comprising a BGA substrate having one principal plane furnished with a large number of solder balls and a first semiconductor chip having a first side and an opposite side. The first semiconductor chip includes bumps and active regions formed on the first side. The first semiconductor chip is attached to another principal plane of the BGA substrate through the bumps. A first chip capacitor is attached to the active regions of the first semiconductor chip. The thickness of the first chip capacitor is less than a thickness of the bumps.

The Examiner asserts that Ference (Fig. 1), McCormick (Figs. 1 and 4), and Lin (Figs. 3D and 3E) disclose a BGA substrate and a first semiconductor chip having a first side and an opposite side, including bumps and active regions formed on the first side,

wherein the chip is attached to another principal plane of the BGA substrate through the bumps. A second chip with a thickness less than that of the bumps is attached to the active regions of the first semiconductor chip. The Examiner acknowledges that neither Ference, McCormick, nor Lin disclose the required chip capacitor. The Examiner relies on Wenzel's teaching of a capacitor or a second chip attached to the active regions of a first chip to assert that it would have been obvious to substitute a capacitor for the second chip in Ference, McCormick, and Lin. The Examiner concludes that it would have been obvious to replace the second chip on the Ference, McCormick, and Lin devices with a capacitor for the benefit of making a compact BGA semiconductor with multiple active and passive ICs.

Ference, McCormick, Lin, and Wenzel, whether taken alone, or in combination do not suggest the claimed semiconductor device. There is no motivation to combine Wenzel with Ference, McCormick, or Lin in the manner asserted by the Examiner. Furthermore, if Wenzel were combined with Ference, McCormick, or Lin the resulting device would feature a chip capacitor with a thickness greater than a thickness of the bumps, not less than a thickness of the bumps, as required by claim 2.

It is not seen how the Examiner-asserted motivation would lead one of ordinary skill in this art to modify the devices of Ference, McCormick, or Lin. Ference, McCormick, and Lin already provide compact semiconductor devices containing multiple ICs. It is not seen how the teaching of Wenzel provides any benefit not already provided for in the teachings of Ference, McCormick, and Lin. In short, there is no realistic motivation in Wenzel to modify the semiconductor devices of Ference, McCormick, and Lin.

Furthermore, even if there were motivation to modify Ference, McCormick, and Lin, the resulting structure would comprise a chip capacitor with a thickness greater than the thickness of the bumps. Wenzel discloses that the second chip/capacitor have a thickness greater than a thickness of the bumps. There is no suggestion in Wenzel to modify Ference, McCormick, and Lin to include a chip capacitor attached to the active regions of a semiconductor chip, wherein the thickness of the chip capacitor is less than a thickness of the bumps.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Wenzel to modify the semiconductor devices of Ference, McCormick, and Lin to include a chip capacitor attached to the active regions of a semiconductor chip, wherein the thickness of the chip capacitor is less than a thickness of the bumps, as required by claim 1.

The requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103 is not an abstract concept, but must stem from the applied prior art as a whole and realistically impel one having ordinary skill in the art to modify a specific reference in a specific manner to arrive at a specifically claimed invention. *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). Accordingly, the Examiner is charged with the initial

burden of identifying a source in the applied prior art for the requisite realistic motivation. *Smiths Industries Medical System v. Vital Signs, Inc.*, 183 F.3d 1347, 51 USPQ2d 1415 (Fed. Cir. 1999); *In re Mayne*, 104 F.3d 1339, 41 USPQ2d 1449 (Fed. Cir. 1997). There is no motivation in Wenzel to modify the semiconductor devices of Ference, McCormick, and Lin to include a chip capacitor attached to the active regions of a semiconductor chip, wherein the thickness of the chip capacitor is less than a thickness of the bumps, as required by claim 1.

The only teaching of the claimed semiconductor device with a chip capacitor attached to the active regions of a semiconductor chip, wherein the thickness of the chip capacitor is less than a thickness of the bumps is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The motivation for modifying the prior art must come from the prior art and must be based on facts.

Upon the allowance of generic claim 2, Applicants respectfully request consideration and allowance of species claims 4, 6, 7, and 9, which depend from generic claim 2, as provided by 37 C.F.R. § 1.141.

Allowable Subject Matter

Claim 3 is allowed. Applicants gratefully acknowledge the indication of allowable subject matter. Applicants respectfully request consideration and allowance of new species claims 17-20, which depend from generic claim 3, and are allowable for at least the same reasons as claim 3.

In light of the Remarks above, this amendment should be entered, the application allowed, and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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